

CODON-OPTIMIZED POLYNUCLEOTIDE-BASED VACCINES  
AGAINST *BACILLUS ANTHRACIS* INFECTION

ABSTRACT OF THE DISCLOSURE

The invention is related to polynucleotide-based anthrax vaccines. In particular, the invention is plasmids operably encoding *Bacillus anthracis* antigens, in which the naturally-occurring coding regions for the *B. anthracis* antigens have been modified for improved translation in human or other mammalian cells through codon optimization. In certain embodiments, the coding regions are also modified so as to remove potential N-linked glycosylation sites. *B. anthracis* antigens which are useful in the invention include, but are not limited to protective antigen (PA), lethal factor (LF), and fragments, variants or derivatives of either of these antigens. The invention is further directed to methods to induce an immune response to *B. anthracis* in a mammal, for example, a human, comprising delivering a plasmid encoding a codon-optimized *B. anthracis* antigen as described above. The invention is also directed to pharmaceutical compositions comprising plasmids encoding a codon-optimized *B. anthracis* antigen as described above, and further comprising adjuvants, excipients, or immune modulators.